

U.S. Patent Application Serial No. 10/572,852
Response to Final OA dated March 26, 2008

REMARKS

Claim 1 has been amended in order to more particularly point out, and distinctly claim the subject matter which the Applicants regard as their invention. The Applicants respectfully submit that no new matter has been added. It is believed that this Amendment is fully responsive to the Office Action dated March 26, 2008.

In the Office Action, Claims 1, 3-6, 8 and 9 were rejected under 35 U.S.C. § 103(a) as unpatentable over Nakao et al. (U.S. Published Application No. 2001/0039710) in view of Kenney et al. (U.S. Patent No. 4,473,103); Claims 2 and 7 were rejected under 35 U.S.C. § 103(a) as unpatentable over Nakao et al. in view of Kenney et al. and further in view of Ishizuka (JP 2-220760); Claims 1, 3-6, 8 and 9 were rejected under 35 U.S.C. § 103(a) as unpatentable over Chung et al. (U.S. Patent No. 6,250,364); Claims 2 and 7 were rejected under 35 U.S.C. § 103(a) as unpatentable over Chung et al. in view of Kenney et al. as applied to Claim 1 and further in view of Ishizuka. Reconsideration and removal of these rejections is respectfully requested in view of the present amendment to the Claims 1 and the following remarks.

Claim 1, as amended, now recites that a liquid phase is present in the metal matrix when the forming of the product is carried out. Claim 1 also now specifies that the heated billet is pressure-formed into a formed product by reciprocating a punch relative to a die wherein the billet, the punch and the die are configured such that the billet, while being pressure formed, has a compression ratio $H/h/1$ differing from one portion of the formed product to another to thereby give the formed product a ceramic volume content that is different from one portion to another, where H is a height of the

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billet prior to pressure forming and h_1 is a thickness of the formed product and corresponds to a height of the billet after pressure forming, and the formed product contains the particles of the ceramic reinforcing material non-uniformly distributed over the entire region thereof. Claim 1 further recites that, during the pressure forming, the punch advances toward the die at a speed not exceeding 300 mm/sec to control the ceramic volume content of the formed product and an advancing movement of the punch toward the die at the speed not exceeding 300 mm/sec causes the metal matrix to flow out from the heated billet into a space defined between the punch and the die while nearly all of the particles of the ceramic reinforcing material are caused to move in the same direction as the advancing movement of the punch, the remainder of the particles of the ceramic reinforcing material being forced by the metal matrix to flow in the same direction as the metal matrix. Claim 1 further specifies that the ceramic volume content of the formed product is directly proportional to the compression ratio of the billet.

It is respectfully submitted that the above features are not taught or suggested by Nakao et al. or Chung et al. In particular, the advancing speed of the punch during the pressure forming, which is set not to exceed 300 mm/sec, enables control of the ceramic volume content of the formed product and provides a ceramic concentration gradient to the formed product. Chung et al. shows an injection-forming process to provide a reinforcement concentration gradient by using a flow restriction formed in a mold so as to hinder the flow of the heated fluid metal matrix. Chung et al. fails to disclose or teach the injection speed or advancing speed of the ram 20, as recited in amended Claim 1.

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New Claim 10 specifies a lower limit of the advancing speed of the punch during the press forming step.

In view of the amendment to Claim 1 and accompanying remarks, removal of this rejection is respectfully requested.

In view of the aforementioned amendments and accompanying remarks, Claims 1-10, as amended, are believed to be patentable and in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, the Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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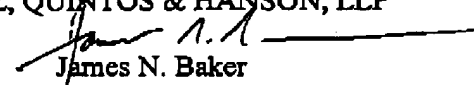
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Enclosure: Petition for Extension of Time



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